

# TFK Extra!

TEACHER'S GUIDE



## Energy Is EVERYWHERE!

**EnergySmart Schools** is designed to support your science, math and social studies curriculum, and educate your students and their families about energy.

In the program materials — this Teacher's Guide and the Student Magazine — you'll find standards-based activities and practical strategies for saving energy. The activities include science experiments and energy-efficiency quizzes.

### BACKGROUND

#### ■ What is Energy?

Scientists define energy as "the ability to do work." When we talk about using energy, we are usually talking about energy that is harnessed to run factories, to provide heat and light in our homes and schools and to power transportation (cars, trains, airplanes, etc.).

The sources of this energy are fossil fuels (gas, oil, coal), nuclear power, wind power (windmills), hydroelectric power (water dams), solar power (sunshine), geothermal energy from the earth and biomass (plants and grasses).

The U.S. Department of Energy works with schools nationwide to help them use energy wisely. For more information on teaching students about energy-related issues visit:  
**[www.eren.doe.gov/energysmartschools](http://www.eren.doe.gov/energysmartschools)**

Supplement to TIME FOR KIDS

#### ■ Sources of Energy

Power plants, industries, buildings and motor vehicles rely mostly on fossil fuels, including coal, oil and gas. These energy sources are found below the earth's surface, where they were formed over the course of millions of years from the remains of plants and animals. They are called nonrenewable energy sources because supplies are limited and cannot be replaced. Fossil fuels have another drawback: when burned, they release pollutants and carbon dioxide, which contribute to global warming.

Nuclear energy is another source of fuel. But the process of producing nuclear energy creates dangerous radioactive wastes.

#### ■ Saving Energy

As our fossil-fuel reserves diminish and concern about global warming grows, the need to use energy more efficiently becomes increasingly critical. Renewable energy sources, such as sunlight, water, wind, geothermal energy and biomass, offer clean energy alternatives. These resources are constantly replaced and are less polluting.

### National Science Standards

#### Grades K-4

Science as Inquiry  
Science in Personal and Social Perspectives

- Types of Resources
- Changes in Environments

Science and Technology

#### Grades 5-8

Science as Inquiry  
Science in Personal and Social Perspectives

- Populations, Resources and Environments
- Risks and Benefits
- Science and Technology in Society

Science and Technology

### National Math Standards

#### Grades K-4

Measurement  
Statistics and Probability

- Construct, read and interpret displays of data

#### Grades 5-8

Measurement  
Statistics

- Systematically collect, organize and describe data

### National Social Studies Standards

**Strand 3:** People, Places and Environment

**Strand 8:** Science, Technology and Society

**Strand 9:** Global Connections



## DAY 1

**Energy And  
the Environment**

**What is energy? How do we use it?  
Why is it important?**

**DISCUSSION**

- Explain that scientists define energy as the ability to do work. Energy is also defined as the ability to be active. Energy can be divided into two different types depending on whether the energy is stored (potential energy) or in motion (kinetic energy). Examples: potential energy in a flashlight's batteries becomes kinetic energy when turned on. Food contains potential energy. Our bodies use the food to do work, kinetic energy.
- Show students a rubber band. Ask: What kind of energy does the rubber band have when it is stretched out? (potential energy) What about when the band is released? (kinetic energy)
- Energy in the form of electricity is used to do all kinds of work. Ask students to identify some of the work electricity enables us to do. List students' answers on the chalkboard.
- Instruct the students to open to TFK p. 2. Ask for volunteers to read the definitions of fossil fuels, renewable fuels and non-renewable fuels. Discuss the differences between nonrenewable and renewable energy sources.
- Explain that we use far more fossil fuels than renewable fuels. This energy use leads to three major problems: (1) diminished supply of fossil fuels, (2) air pollution and (3) carbon dioxide in the atmosphere. Carbon dioxide contributes to both the greenhouse effect and global warming.



- Have students look at the TFK cover to see how many types of energy sources they can find.

**MATERIALS**

- TFK pp. 2-3
- Two small thermometers
- A clear plastic container
- Sun lamp or access to sunny area for each group

**ACTIVITY**

- Explain and discuss the global warming illustration on TFK p. 3. Discuss the definitions of the greenhouse effect and global warming.
- Divide the class into two or more groups. Distribute materials to complete the greenhouse gas experiment.
- Explain the experiment and supervise students as they follow the instructions.
- After completing the experiment, encourage students to discuss their findings.

## DAY 2

### EnergySmart Schools

**How can we save more energy at school?**

#### MATERIALS

- TFK pp. 4, 6, 7, 8

#### ACTIVITY

- Review Day 1. Students should understand the following points: When fuel is used, it changes from potential to kinetic energy. Because fossil fuels create pollution when burned, and because supplies of fossil fuels are limited and nonrenewable, we need to find ways to reduce our dependence on them. Two ways to do that are: (1) through energy efficiency and (2) by using clean renewable energy. Also, students should be able to discuss global warming, the greenhouse effect and ways to stop global warming.
- Explain that schools use a large amount of energy through their heating and

cooling systems, lighting, computers and appliances.

- Have students take the classroom energy quiz on p. 4 of TFK.
- After completing the quiz, have the class report their scores.
- Discuss the answers.
- Review the Top 5 Ways to Save Energy at School (TFK, p. 8).
- Assign the home energy quiz (TFK pp. 6 and 7). Go over the quiz together, using the classroom as an example where appropriate. Answer questions students may have. Ask students to bring the completed quiz to class on Day 4.



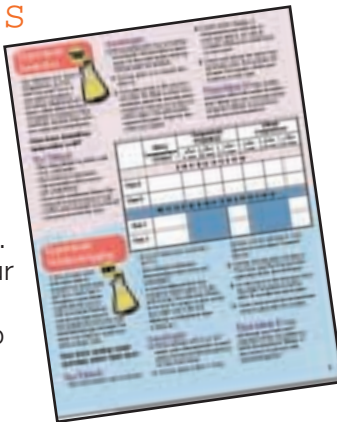
## DAY 3

### EnergySmart Buildings

**How can we make buildings more energy efficient?**

#### MATERIALS

- TFK p. 5
- The materials required for each activity are described on p. 5 of TFK. Make sure your students will have access to a table fan.



#### ACTIVITY

- Review Day 2.
- Explain that the biggest use of energy at home and school is in heating and cooling air and water. Today students will conduct activities to learn how insulation and weatherstripping can save energy.
- Divide the class into two or more groups. Have students review TFK p. 5. Provide students with the materials needed to complete one of the two activities. Supervise students as they follow the instructions. (In advance, you will need to use a sharp knife to prepare boxes for the weatherstripping experiment.) Be sure that each group records the water temperature at the beginning of the activity and at the prescribed intervals.
- After completing their charts, have group members report their results.

## DAY 4 EnergySmart Homes

### How can we save more energy at home?

#### MATERIALS

- TFK pp. 6, 7 and 8

#### ACTIVITY

- Review Day 3.
- Ask students to share what they learned using the home energy quiz and record their responses on the chalkboard. Discuss students' ideas and plans for improving energy efficiency at home.
- Divide the class into two groups. Have each group create a list of five questions and an-

swers based on their home energy quizzes. (Sample questions: How much insulation is recommended for an attic? What is weatherstripping, and why is it important?) Review students' questions and answers.

- Review the Top 5 Ways to Save Energy at Home (TFK, p. 8).



## DAY 5 EnergySmart Contest

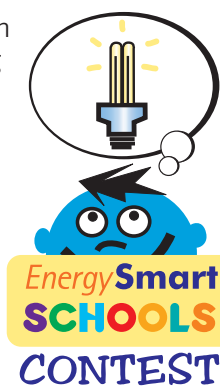
### How do your students think we should save energy?

Visit the EnergySmart Schools website at:

**[www.eren.doe.gov/energysmartschools](http://www.eren.doe.gov/energysmartschools)**

to read how your students can enter the latest energy-saving contest. See the TFK delivery wrap for official contest rules and entry form.

Encourage your students to create and submit their contest entries!



## POWERFUL SITES

The U.S. Department of Energy:  
**[www.eren.doe.gov](http://www.eren.doe.gov)**

The White House:  
**[www.whitehouse.gov/Initiatives/Climate/main.html](http://www.whitehouse.gov/Initiatives/Climate/main.html)**

Owens Corning:  
**[www.owenscorning.com](http://www.owenscorning.com)**

Energy Savers:  
**[www.eren.doe.gov/consumerinfo/energy\\_savers](http://www.eren.doe.gov/consumerinfo/energy_savers)**